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(56) Documents Cited

GB 2031486 A

GB 1509900 A

US 5586502 A

US 4367682 A

US 3841221 A

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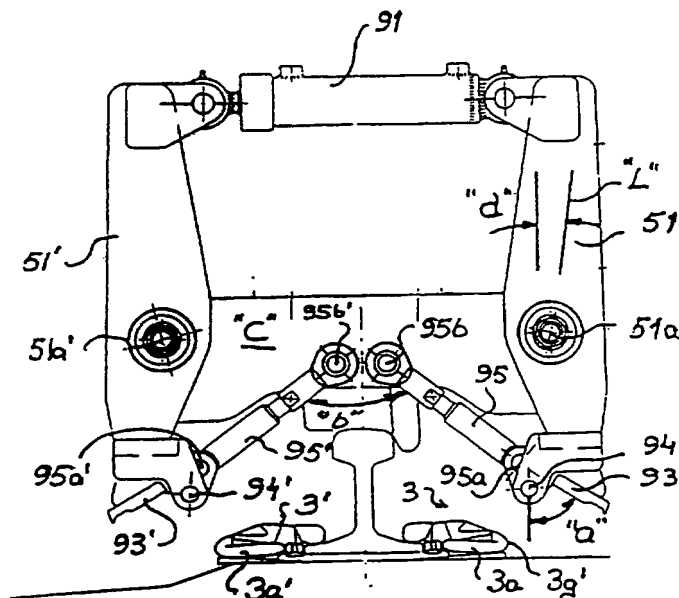
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(54) Abstract Title

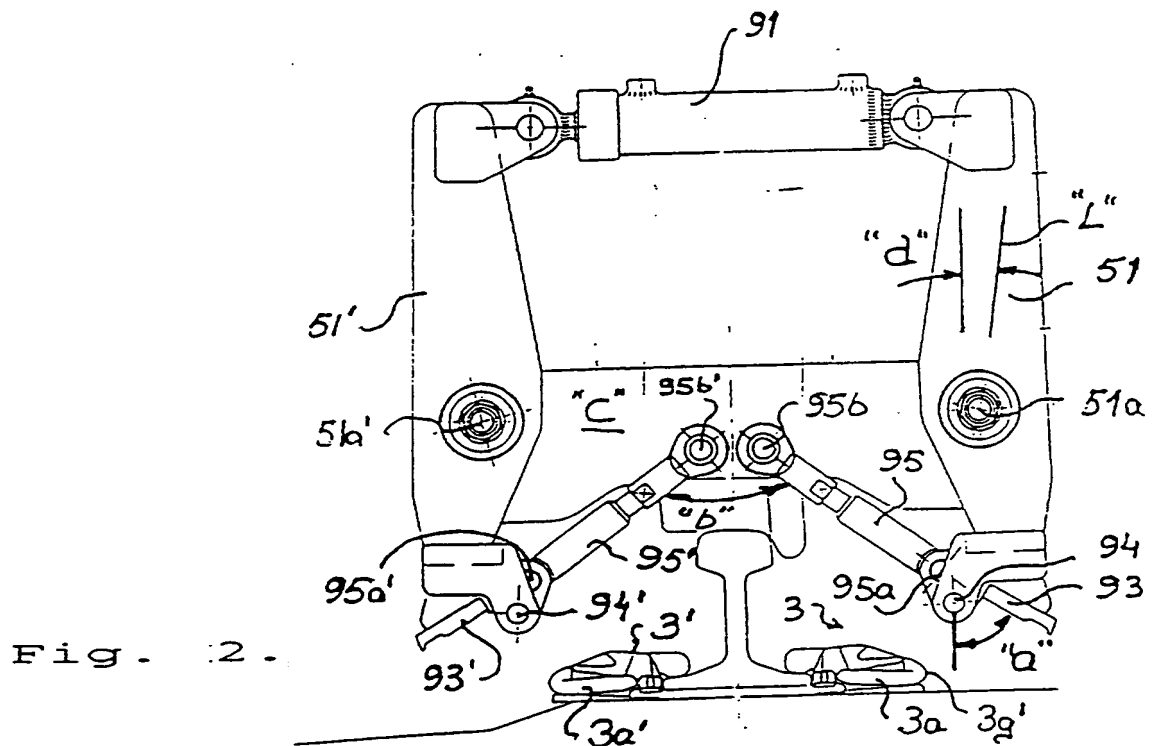
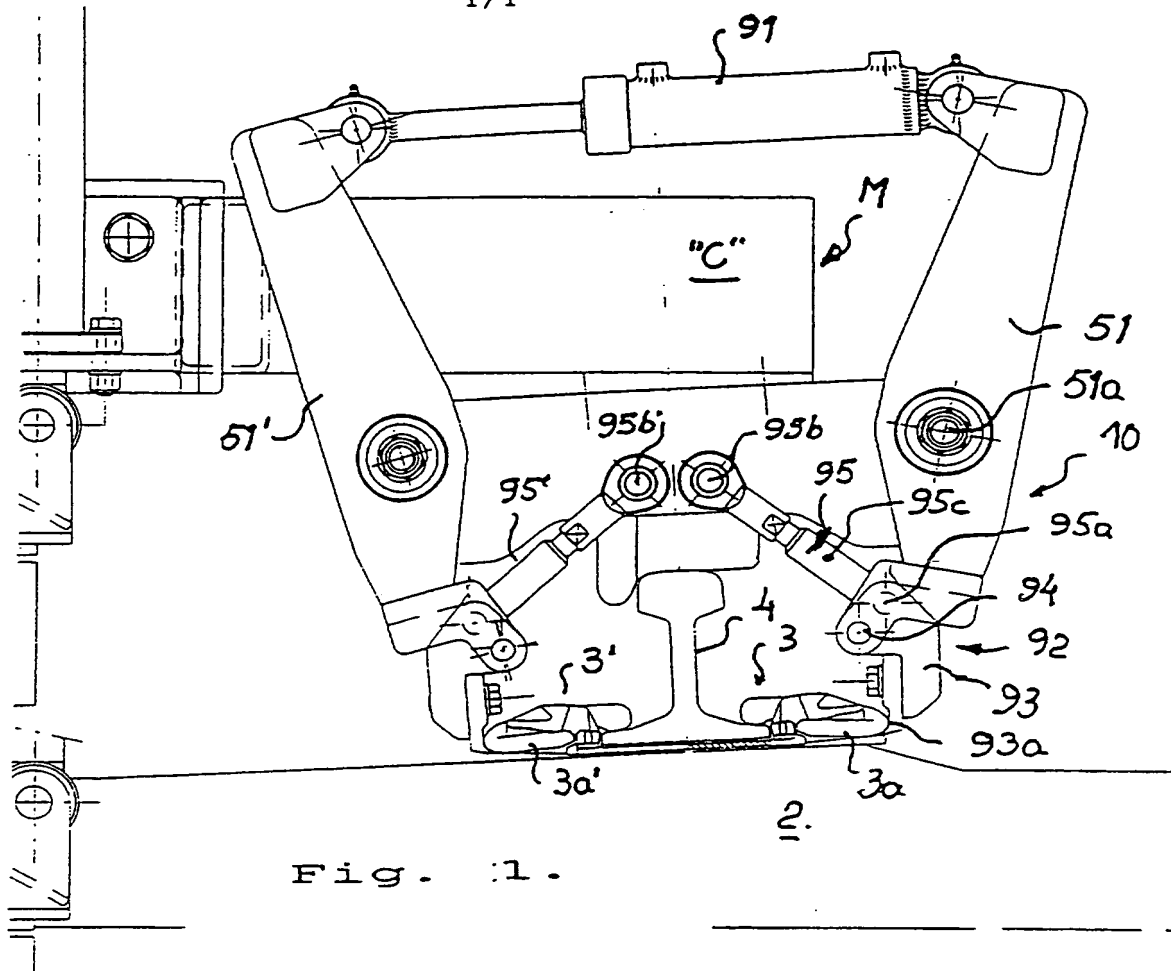
An arrangement for acting on a clamping element movably related to a railway sleeper

(57) The arrangement acts on the element (3a), forming part of a clamp unit (3) by moving it generally horizontally to a position in which a rail section (4) is fastened or secured to the underlying sleeper (2) by a main actuated lever arm (51, 92), including an actuating shoulder (93) which is pivotally mounted (94) for movement to a vertical, or at least essentially vertical, position when a clamping element is fully inserted. The shoulder (93) retracts to an oblique downwardly facing position subsequent to insertion of the clamping element (3a), by means of adjustment of the length of a strut (95), e.g. by a ball-screw.

Fig. 2.



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AN ARRANGEMENT FOR BRINGING A CLAMPING
ELEMENT TO A FASTENING POSITION

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The present invention relates to an arrangement for bringing at least one clamping element to a fastening or clamping position, and more particularly to an arrangement for bringing at least one clamping element that is movably attached to a railroad sleeper and forms part of a clamp unit to a position in which a rail section is fastened to the railroad sleeper.

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The invention is based on moving the clamping element horizontally, or at least generally horizontally, to the rail section through the medium of an actuator.

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The present invention can be considered to constitute a further development of the arrangement described and illustrated in Swedish Patent Application 9702386-5 filed on June 23, 1997 or International Patent Application PCT/SE98/01225.

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Reference is made to the contents of the aforesaid Swedish Patent Application with respect to the present standpoint of techniques.

When taking into consideration the technical deliberations
5 that a person skilled in this particular art must take in order to provide a solution to one or more technical problems that he/she encounters, it will be seen that on the one hand it is necessary initially to realise the measures and/or the sequence of measures that must be undertaken to this end, and
10 on the other hand to realise which means is/are required in solving one or more of said problems.

In respect of an arrangement with which a clamping element that forms part of a clamp unit and is movably attached to a
15 railroad sleeper can be brought to a position for fastening a rail section to an underlying sleeper, it will be seen that a technical problem resides in realising the significance of and the advantages afforded by enabling an actuating shoulder on the actuator to be mounted for pivotal movement between a
20 vertical or an essentially vertical position in the case of a fully inserted clamping element, and a position facing obliquely away from said rail section subsequent to movement for insertion of the clamping element.

25 It will also be seen that a technical problem resides in realising the significance of and the advantages afforded by enabling said shoulder to pivot through an angle of between 30° and 60°, preferably about 45°, so as to enable the actuating shoulder to be moved away to a position in which it is
30 able to pass-by and over any obstacles that may be present along the track-laying section, such as heaps of gravel.

It will also be seen that a technical problem resides in providing such an arrangement that is so compact as to enable it
35 to be used in conjunction with rail sections where one rail is located very close to an adjacent current conducting rail.

It will also be seen that a technical problem resides in realising the significance of and the advantages afforded by pivotally mounting the actuating shoulder at a bottom free-end of a lever arm, such as an arm of a two-arm lever arrangement.

It will also be seen that a technical problem is one of realising the significance of and the advantages afforded by pivoting the actuating shoulder in response to rotation of the lever arm arrangement with the aid of a fixed strut whose bottom end is pivotally attached to said shoulder and whose top end is pivotally attached to a chassis.

It will also be seen that a technical problem resides in realising the significance of positioning a pivot axle for attachment of the actuating shoulder to the bottom free-end of the lever arm beneath a bottom pivot axle of the fixed strut.

It will also be seen that a technical problem is one of realising the significance of allowing the fixed strut to co-act with means for extending or shortening the distance between said upper and lower axles.

It will also be seen that a technical problem is one of realising the significance of making the shoulder sufficiently short to enable it to swing about an axle positioned within the rail section.

Another problem is one to provide an embodiment which uses two arrangements that each have a fixed strut for one rail section, for pair-wise actuation of two clamping elements included in clamp units disposed on respective sides of the railroad rail, so as to allow the two fixed struts to be placed adjacent to and close to one another with respect to their pivotal attachment to the chassis, and therewith

adapted to diverge downwardly at an angle of 80-120°, such as 95-110°.

5

With the intention of solving one or more of the aforesaid technical problems, the present invention takes as its starting point an arrangement which enables a clamping element which is movably attached to a railroad sleeper and forms part of a clamp unit to a position in which it fastens a rail section to an underlying railroad sleeper, by moving the clamping element horizontally or at least generally horizontally towards the rail section, through the medium of an actuator.

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According to the present invention, the actuator is provided with an actuating shoulder which can be swung between a vertical or at least a generally vertical position when the clamping element is fully inserted and an oblique downwardly facing position or a slightly raised position subsequent to having inserted the clamping element.

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According to preferred embodiments that lie within the scope of the inventive concept, the shoulder is able to rotate through an angle of between 30° and 60°, preferably through an angle of about 45°.

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The actuating shoulder will preferably be pivotally mounted on the free-end of a lever arm, such as an arm of a two-arm lever system.

35

The actuating shoulder is rotated through the medium of a fixed strut, one end of the strut being pivotally attached to the shoulder and the other end pivotally attached to a chassis.

It is also proposed that the pivot axle that attaches the shoulder to the free-end of said arm is located beneath the pivot axle of the fixed strut.

5 It is also proposed in accordance with the invention that the fixed strut shall co-act with means whereby the distance between the attachment points or axles can be lengthened and shortened.

10 The actuating shoulder is arranged so as to be pivotal about a pivot axle positioned within the rail section.

According to one particular embodiment of the invention there is used two such arrangements where two fixed struts are
15 placed adjacent one another in the chassis with respect to their pivotal attachment thereto, and diverge downwards at an angle of 80-120°, such as 95-110°.

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Those advantages that are primarily afforded by the invention reside in the ability to readily create conditions in which an actuating shoulder on the actuator can be pivotally mounted on the lever arm thereof and by virtue of the pivotal
25 attachment of the shoulder is able to take a vertical position when it has moved the clamping element horizontally to a fully inserted position, and is able to take an oblique downward and slightly raised position distal from the rail section subsequent to insertion of the clamping element, where-
30 with the shoulder will be located at a distance above the clamping element and is able, in this inactive position, to pass over obstacles present in the rail-laying bed, such as heaps of gravel, in respect of transport from one clamping element to an adjacent clamping element on the same side of
35 the rail section.

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The invention will now be described in more detail with reference to an exemplifying embodiment thereof and also with reference to the accompanying drawings, in which

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Figure 1 is a side view of an inventive arrangement shown transversely to a railroad track, wherein the arrangement is shown in an active state in which two clamping elements of respective clamp units have been inserted to a position in which they secure the rail section to an underlying railroad sleeper; and

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Figure 2 is a similar view which illustrates the arrangement in an inactive state, i.e. a state in which the arrangement is moved from one clamping element to an adjacent clamping element in respect of the same rail section.

25

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Reference is made to the Swedish Patent Application mentioned in the introduction, for a closer understanding of the fundamental principles of the present invention.

35

Thus, Figure 3 of the application document shows a single rail section 4 with two clamping elements 3a, 3a' each be-

longing to a respective clamp unit, and an arrangement for simultaneous actuation of the two clamping elements.

5 The following description will thus be made with reference to solely one clamp unit 3 with an associated clamping element 3a.

10 The mobile unit "M" includes a chassis "C" to which the fastening device or means 10 shown in Figures 3 and 4 of said document are fixedly related.

15 The scissors-like means including the lever arms 51 and 52 is thus actuated by means of a single piston-cylinder arrangement 91.

20 The device 10 is thus adapted to move a clamping element 3a of a clamp unit 3 movably attached to a sleeper 2 from a non-engaging or releasing position to a position in which the rail section 4 is fastened to an underlying sleeper 2, a fastening position.

25 This is achieved by moving the clamping element 3a horizontally, or generally horizontally, towards the rail section 4 through the medium of an actuator 92.

30 As will be evident from Figures 1 and 2, the actuator 92 can be moved reciprocatingly towards and away from the rail section 4 in response to pivotal movement of the lever arm 51 about an attachment axle 51a. This movement is designated the "actuating movement" and follows an essentially circular-arcuate path. The actuator 92 includes or is provided with an actuating shoulder 93.

35 The actuating shoulder 93 is pivotally mounted on a pivot axle 94 for movement between a vertical or at least generally vertical position, Figure 1, in which the clamping element 3a

is in a fully inserted position, and a position in which the shoulder faces obliquely downwards away from the rail section 4, Figure 2, subsequent to insertion of the clamping element 3a.

5

The clamping element 3a is thus moved from an outer position (not shown) to an inner, fastening or securing position (according to the Figures) in response to clockwise rotation of the lever arm 51 about the pivot axle 51a, therewith applying to the shoulder 93 a horizontal actuating movement (the movement of the lower free-part of the lever arm 51, although in a slightly arcuate path) at least in the final phase of the movement of the actuating shoulder.

10

During this actuating movement, the actuating shoulder 93 moves in an arcuate path from the position shown in Figure 2 to the position shown in Figure 1 about a rotational axle 94, which accompanies the arcuate actuating movement.

15

The pivotal movement of the shoulder 93 between the aforesaid end positions is illustrated in Figure 2 with the angle "a".

20

The pivot angle "a" shown in Figure 2 is between 30° and 60°, preferably about 45°, in the illustrated case an angle of

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The actuating shoulder 93 is pivotally attached by the attachment 94 to the bottom free-end of the lever arm 51 included in a two-arm lever arrangement, whose upper part can be activated by the piston-cylinder arrangement 91.

30

The actuating shoulder 93 is pivoted with the aid of a fixed strut, by which is meant a fixed strut of adapted length.

The strut 95 is pivotally mounted to the shoulder 93 by means of a pivotal attachment 95a, and is also pivotally mounted to a chassis "C" by a pivotal attachment 95b.

5 The pivot axle 94 by means of which the shoulder is attached to the free end of the lever arm 51 is constantly beneath the pivot axle 95a of the fixed strut 95.

10 The fixed strut 95 co-acts with means 95c for extending for shortening the distance between the two pivot points 95a and 95b. According to the present invention, a bottlescrew arrangement is used to this end.

15 The actuating shoulder 93 can be rotated on the pivot axle 94, said axle being positioned within the rail section 4 and only slightly above the clamp unit 3. This distance shall be 2-5 cm in the illustrated case.

20 The embodiment illustrated in Figures 1 and 2 includes two fixed struts 95, 95', each allocated a clamping element 3, 3' in the inventive arrangement and being fastened to the chassis "C" and positioned close together with respect to their pivot attachments 95b, 95b'.

25 The two, fixed struts diverge towards the lower parts of respective arms 51, 51' at an angle "b" of 80-120°, such as an angle of 95-110°.

30 In the illustrated case, the struts diverge at an angle of about 105°.

To avoid troublesome upwardly acting force components upon co-action of the actuating surface 93a of the actuating shoulder 93 with the outer surface-part of the clamping element 3a, the pivot axles 51 and 51a' may be placed closer together than illustrated.

For instance, a vertical line taken from the outer part 3g' of the clamping element 3a may pass through the pivot axle 51a.

5

Although the illustrated embodiment may be considered to generate a slightly upwardly directed force component, the effect of this force can be compensated for by giving the hook-shaped recess forming the actuating surface 93a a height dimension that exceeds the dimension of the outer part 3g' of the clamping element 3a, therewith achieving a force-component reducing sliding action between the outer part and the actuating surfaces.

10

As evident from Figure 2, a line "L" between the attachment 51a and the pivot axle 94 defines an angle "d" with a vertical plane, wherewith as the arm 51 rotates the pivot axle 94 will wander upwards while increasing the angular value "d" along a circular-arcuate path to the position shown in Figure 1.

20

Such movement would clearly exert an upwardly acting force component on the clamping element 31.

This can be compensated for, by allowing pivotal movement of the actuating shoulder 93 about the pivot axle 94 within said angular value "a" to wander downwards while decreasing said angular value "a" around a circular-arcuate path to the position shown in Figure 1.

30

CLAIMS

1. An arrangement for moving a clamping element movably related to a railroad sleeper and included in a clamp unit to a position in which a rail section is fastened or secured to an underlying railroad sleeper, by moving said clamping element horizontally, or at least generally horizontally, towards the rail section through the medium of an actuator, characterised in that the actuator includes an actuating shoulder which is pivotally mounted for movement between a vertical, or at least essentially vertical, position when a clamping element is fully inserted, and an obliquely, downwardly facing position subsequent to insertion of the clamping element.
2. An arrangement according to Claim 1, characterised in that said shoulder is adapted to pivot through an angle of between 30° and 60°, preferably through an angle of about 45°.
3. An arrangement according to Claim 1 ^{or claim 2,} characterised in that the actuating shoulder is pivotally mounted on the free-end of a lever arm forming part of a lever arm arrangement.
4. An arrangement according to Claim 3, characterised in that the actuating shoulder is pivoted through the medium of a fixed strut which is pivotally attached to said shoulder and also to a chassis.
5. An arrangement according to Claim 4, characterised in that a pivot axle for attachment of the actuating shoulder to the free end of said arm is located beneath the pivot axle of the fixed strut.
6. An arrangement according to Claim 4 ^{or claim 5,} characterised in that said fixed strut functions to enable the distance between said pivot points to be lengthened or shortened, in conjunction with means herefor.

7. An arrangement according to Claim 1, characterised in that the actuating shoulder pivots about an axle positioned within the rail section.

5

8. An arrangement according to Claim 4, characterised in that two struts are pivotally attached to the chassis in close relationship and diverge downwards.

10

9. An arrangement according to Claim 8, characterised in that the divergent angle is 80-120°, such as 95-110°.

15

10. An arrangement according to Claim 3, characterised in that the pivot point of ^{the} lever arm and the pivotal attachment of the actuating shoulder and/or the shape of the actuating shoulder are mutually related for applying an actuating force horizontally on the clamping element.

11. An arrangement for moving a clamping element movably related to a railroad sleeper substantially as described with reference to and as illustrated by the accompanying drawings.



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Application No: GB 9824170.6
Claims searched: 1-11

Examiner: Roger Binding
Date of search: 5 May 1999

Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): E1G (GGA, GGD)

Int Cl (Ed.6): E01B 29/24

Other:

Documents considered to be relevant:

| Category | Identity of document and relevant passage | Relevant to claims |
|----------|---|--------------------|
| X | GB 2031486 A (RACINE RAILROAD PRODUCTS) | 1, 2, 7 |
| X | GB 1509900 A (PANDROL), see page 5, lines 2 to 72. | 1 |
| X | US 5586502 A (WEBER), see especially column 7, line 48, to column 8, line 35. | 1-3 |
| X | US 4367682 A (FREILICH), see Figs 5 and 6. | 1 |
| X | US 3841221 A (DIERINGER), see Figs 5 to 8. | 1, 2 |

X Document indicating lack of novelty or inventive step
Y Document indicating lack of inventive step if combined with one or more other documents of same category.

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A Document indicating technological background and/or state of the art.
P Document published on or after the declared priority date but before the filing date of this invention.

E Patent document published on or after, but with priority date earlier than, the filing date of this application.